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DEVELOPING GEOTOURISM WITH A FOCUS ON GEOHERITAGE IN A TRANSBOUNDARY REGION: THE CASE OF THE CURONIAN SPIT, A UNESCO SITE

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Recreation in protected areas (PAs) has received special attention amid international travel restrictions. The conflict between the conservation and economic use of these territories is increasing. This work aims to find ways to optimise and modernise environmental outreach and recreation in national parks as a type of PAs. Geotourism is viewed here as a sustainable form of tourism bridging the gap between conservation and recreation. Several objectives have been attained to fulfil this aim. The first one was the analysis of the best practices of geotourism development in PAs; the second one was measuring the resource potential for diversifying ecotourism events in PAs; the third objective was designing an algorithm for creating a geological heritage-focused eco-trail, an innovative recreation product aimed at environmental education and community outreach. The authors view the methodology for geo-tour design as an example of heritage preservation and propose a new tourist trail — the Geological and Geomorphological Chronicle of the Baltic Sea. This tour acquaints sightseers with the nature of the Curonian Spit National Park, a unique geological and geomorphological feature whose landscapes are a product of centuries-long human-nature interactions. Twenty years ago, in 2000, the conservation area was listed by UNESCO as a place of considerable natural significance. The field studies were carried out as part of the international project Ecotour4Natur: Ecotourism as a Tool for the Preservation of Natural and Cultural Heritage within the Lithuania-Russia Cross-border Cooperation Programme 2014—2020. The developed algorithm for eco-trail design may benefit other national parks as well.

Keywords:
geotourism, geo-heritage, ecotourism, sustainable development, tourist trail design methodology, Curonian Spit, protected areas, geological and geomorphological resources, Kaliningrad region, transboundary studies

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Introduction

Amid the Covid-19 pandemic, the demand for domestic tourism has soared dramatically leading to a massive influx of tourists to specially protected natural areas (PAs), particularly those located near large urban agglomerations or resort areas. This poses the risk of conflict between the recreational activities of tourism enterprises and nature conservation as the major policy of the Ministry of Natural Resources and Environment. At the same time, in search of innovations meeting both the reserves' conservation needs and the increased demand from tourism organizations (and independent tourists) destinations with centuries- or even millennia-old tourist sites are unjustly overlooked.

Since the 1980-s there has been an ongoing scientific discussion on whether the term geotourism refers to geology or geography. This article shows that geotourism is at least a three-component concept. On the one hand, it applies to the resources created by nature itself; on the other hand, the creation of routes is directly related to geography (including geomorphology), the study of wildlife and inanimate nature, conservation through development, studies, and recreational use. National parks are the most universal kind of PAs as they allow combining the functions of education, research, recreation, and tourism. At the same time, geotourism can and should be viewed as a niche of nature-oriented tourism aimed at the sustainable development of tourism in PAs.

One of the essential tasks of the PAs is environmental education, i. e. passing on the accumulated information to their visitors within the framework of educational tourism activities. Nowadays, the geographic spaces of PAs are complex multi-component biogeocenoses with geological structures being their integral parts. Understandings of the PAs' operational principles vary. In recent years, the international literature has been widely using the term "geotourism" incorporating geographic and geological aspects. However, it seems also important to identify the recreational component as an objective of management and operational subsystem within the framework of PAs' operation. Taking into account a historically developed complex system of flora and fauna tied to certain geological and geomorphological structures and landscapes, as well as the historical and cultural potential and heritage of the territory, it is possible to formulate an idea of the inextricable unity of the content space of PAs. According to the regulations, the key functions of national parks as protected areas are nature conservation, nature study, and limited recreational activities, in the order indicated.

The Curonian Spit National Park came into the focus of this research for a valid reason. The data shows that over a long time the number of visits to the Curonian Spit has been steadily growing. This growth is accompanied by violation of environmental regulations and overuse of the recreational capacity of existing tourist routes. All this reduces the recreational and tourist value of the park and

practically excludes the possibility of environmental education shifting the focus of attention to just visiting the site. Excessive use of recreational capacity affects not only tourists' impressions but also the preservation of landscapes and natural objects, as well as their functioning.

Thus, a conflict arises between the major functions and operational framework of the national park as high attendance, supposedly leading to an increase in the recreational effectiveness, threatens the preservation of valuable biogeocenoses and further reduces the recreational effect. Another problem is the distortion of the recreational effect itself, i. e. focus on "visiting" instead of "ecological education and impressions". One of the ways to resolve the contradiction is to change the model of tourist activities in the PA as well as the related elements of information services and infrastructure.

The article aims to identify the ways to improve recreational and educational activities through the development of new types of tourism on their territory. Global practice shows that geotourism is considered to be one of the sustainable forms of tourism. However, it is possible only in territories with a certain potential (international literature widely uses the concepts of georesources and geoheritage). These natural resources (objects) must be properly studied, described and adapted for the general public; a special route needs to be created too. It is important that such a route did not affect the protected areas, therefore, it requires certification by PAs researchers, and, in some cases, approval by the Ministry of Natural Resources and Environment (in the Russian Federation).

Since the above activities are largely in line with the environmental educational policies of national parks, it is expedient to consider opportunities for the development of geotourism on the territory of the Curonian Spit, a UNESCO site. Another objective is to develop an algorithm for creating such a tourist trail, drawing on the example of the Curonian Spit National Park.

Geotourism as a trend in the use of a territory's natural heritage (geoheritage)

The concept of geotourism has progressed from a way of involving natural areas in tourism activities to the creation of a network of geoparks as territories with unique geographic features.

Geotourism developed as a special area of tourism in the 1980s-90s. At first, it was mainly associated with the transformation of reclaimed mining areas into tourism objects. T. Hose [1; 2] described the English origins of the trend. Alongside other European scientists, he substantiated the connection between the preservation of natural heritage and the development of geotourism. Although over the past fifteen years European scientists have suggested various interpretations of geotourism, almost always its definition has included the study of the physical foundations, means of interpretation and the promotion of geo-objects and geoheritage [3]. For example, M. Gray, speaking about natural heritage, uses

the term "geodiversity" encompassing the diversity in living and inanimate nature. Identifying various types of geodiversity values (cultural, economic, functional, scientific, and educational), Gray also ascribes an aesthetic value to geotourism and recreational activities [4]. Gordon takes a similar position noting that the valuation of assets, values and benefits of geoheritage within the service framework of a cultural ecosystem can provide for a more holistic approach to geotourism; he also acknowledges the links between people, geo-heritage, and landscape. In addition to the results of geoconservation and economic returns to communities, relationship benefits for participants include improved health and well-being through aesthetic and spiritual enrichment, opportunities for recreation, physical activity, inspiration, reflection, research, and validation of cultural identity [5, p. 14]. There are studies substantiating the development of this type of tourism as a sustainable trend [6; 7].

Starting from 2001, the year of the creation of UNESCO Global Geoparks[1], researchers mainly study geotourism as one of the forms of their promotion. For instance, S. Justice studies the Geopark of Chablis in France [8]; R. Becerra-Ramírez with co-authors describe the geotouristic resources of the Geopark of the Campo de Calatrava Volcanic Region in Spain [9]. Polish researchers not only describe geoparks already existing in their country but also substantiate the creation of new ones, for example, Geopark "Stone Forest in Roztocze" [10]. Romanian scientists propose to develop urban geotourism based on the natural (river) and historical and cultural (fortress) heritage of the city of Oradea [11]. A relevant approach to the study of the development of geotourism in PAs is presented in the assessment of natural resource potential based on the zoning of the territory of Western Kazakhstan for recreation and tourism [12].

F. R. Ardislamov formulates the very concept of a geopark using the example of the Toratau UNESCO Geopark. "A geopark is a managed territory containing protected objects of natural, historical, and cultural heritage, unique geological objects and landscapes and adapted for recreational, social and other functions" [13]. According to the definition, a geopark aims not only to study and protect but also to provide for recreational processes.

In Russian scholarly literature, the topic has not been thoroughly researched. Studies on natural heritage and geotourism are done mainly for the mountainous areas. For instance, N. P. Soboleva examines the geo-resources of tourism and substantiates their use to ensure the sustainable development of the Altai Republic [14]. A. G. Redkin and O. V. Otto propose the creation of a geopark as a new direction of tourism in the same mountain system [15]. A Russian geotourism theorist prof. D. Ruban mostly draws on the example of the North Caucasus [16; 17]. His work "Geoconservation organizations and management support for their effective activities in the context of the paradigm of the use of specially protected

[1] *Unesco Global Geoparks*, 2020, available at: https://unesdoc.unesco.org/ark:/48223/pf0000247511 (accessed 02.10.2021).

natural areas" is of particular interest for our study. It identifies the priorities of geoconservation activities and formulates the necessary management decisions for their implementation [18].

On the territory of the Kaliningrad region of the Russian Federation, scientific research in this field mainly focuses on the geoecological aspects of nature management and coastal protection issues. This is largely due to the established scientific school of geoecologists and geographers of the I. Kant Baltic Federal University [19—21].

In Lithuania, the Tourism Law was enacted in 1998; it was last reviewed in 2015[2]. Until recently, the concept of "geotourism" has not been legally defined. It has enjoyed different interpretations covering the processes of tourism development in natural parks, coastal zones, in landscapes with various geomorphological and geological formations. The definition of geotourism is found in the feasibility study for the removal of shipping barriers in the Curonian Lagoon [22], which states that the concept of geotourism encompasses visually and scientifically interesting forms of landscapes, observation of morphological, climatic, and hydrographic processes, as well as attractive cultural heritage sites influenced by the environment, including geological processes.

In Lithuania, the definitions and concepts of geotourism are closely related to eco- and environmental tourism; however, geotourism as a specific concept has not been properly developed either in applied tourism research or in tourism development strategies.

Recognizing that geography is an integrated science, and following the Geographical Society, researchers view geotourism as tourism that supports or enhances the distinctive geographical character of a place, including its environment, heritage, aesthetics, culture, and the well-being of its inhabitants[3].

The objectives of geotourism, depending on the form of its organization, include improving the ecological culture, deepening and systematizing the knowledge of geology and geomorphology within the school curriculum, providing for schoolchildren's research on local history, as well as for wellness and organized recreational activities [23, p. 2].

For the proposed geotour, the following key landscapes of the spit with their historical and geomorphological features were selected from the available scientific literature. The basic information on them is as follows.

Important milestones in geological and geomorphological history. After the Valdai glaciation, an undulating moraine plain crossed by a hilly ridge formed on this territory. On the site of the Baltic Sea, the following water bodies were located in their successive order: the cold Baltic Ice Lake, the salty Yoldia Sea, the warm Ancylus Lake, and the Litorina Sea (once the straits opened connecting the Lake to the world ocean). The Curonian Spit was formed by the transgression

[2] Lietuvos Respublikos Turizmo įstatymas, 2015 (In Lithuanian).

[3] Geotourism, 2020, *National Geographic*, available at: https://www.nationalgeographic.com/maps/topic/geotourism. (accessed 10.02.2021).

of the Litorina Sea six thousand years ago[4]. About five thousand years ago, after flooding, the plateau in the area of Rybachy acquired its modern shape and location. Its constituent islands changed their outlines and increased their size, sandbanks formed between them covering the moraines as they subsided. A sandy plain had formed on the islands with its wandering dunes driven by the wind. Their growth and movement together with the uneven load on the base of the spit resulted in a unique geological phenomenon: the lagoon sediments with ancient molluscs were squeezed out from under the dune sands. The dying off and accumulation of vegetation created the forest soil, in which archaeologists find traces of ancient people.

Methods and methodology

To study the best practices for the development of geotourism in protected natural areas, a bibliographic method was applied for tracing the evolution of the geotourism concept from its origin to its use in Russian scholarship. The goal-setting method was applied to identify the potential for the diversification of ecotourism activities in the PAs. To optimize the process of innovative recreational activities aimed at environmental education, a modelling method was used which made it possible to develop an algorithm of the steps (stages) involved in the ecotrail design. The new route was tested during the implementation of the Ecotour4Natur project[5], which involved the development of the geology-geomorphological tour "Geological and geomorphological chronology of the Baltic". To this end, several mini-expeditions (field research method) were organized in 2020—2021 to research 10 natural objects, 10 cultural and historical objects (on the 35—40 kilometres of the national park) on the Russian territory of the Curonian Spit and 20 objects on its Lithuanian part in the vicinity of Nida. The study also relies on archival and historical materials. The assessment of the territory and the laying of the trail (routing) was carried out using publicly available Google maps and GIS technologies.

Results

The main organizational form of environmental education and exploration of natural and cultural attractions of PAs is the ecotrail. An ecotrail is an established route for tourists to move along and explore unique natural objects and attractions. The infrastructure of the trail reduces the load on the ecosystem

[4] Materials of a comprehensive environmental study of marine and coastal areas of the Curonian Spit National Park for granting these areas the legal status of a marine protected zone. *Implementation of the Baltic Sea Action Plan in Russia (BASE) project*, 2020, available at: https://helcom.fi/media/publications/Extension-of-the-marine-protected-zone-of-the-Curonian-Spit-Final-Report-in-Russian.pdf (accessed 10.04.2021).

[5] Ecotourism as a tool for preserving natural and cultural heritage, 2020, *Ecotour4Natur*, available at: http://special.kantiana.ru/ecotour-lt-ru (accessed 10.03.2021).

while its information system (boards and audio guides) gives a better opportunity to explore the objects of display. There are different kinds of trails, including landscape, botanical, zoological, hydrological, as well as integrated ones.

The results of the international project "Ecotourism as a tool for the preservation of natural and cultural heritage" show that numerous excursions to the Curonian Spit National Park do not properly cover the issues related to its geomorphology, although they are extremely important for ensuring its environmental safety. In addition, independent tourists dominate the tourist flows on the territory of the park. According to the park's public affairs office[6], during the three summer months of 2020, 844 buses carrying 20 thousand tourists coming in organized groups visited the park. Meanwhile, more than 500 thousand people in total visit it annually, and most of them are independent tourists. Despite the systematic efforts of the park administration to design and establish new ecotrails, every year its staff detects hundreds of violations of the PA conservation regime.

The study on the geomorphology of the Curonian Spit involved the development of the algorithm for designing an ecotrail "Geological and Geomorphological Chronicle of the Baltic" providing comprehensive protection of this unique natural monument vulnerable to mechanical damage (Fig. 1).

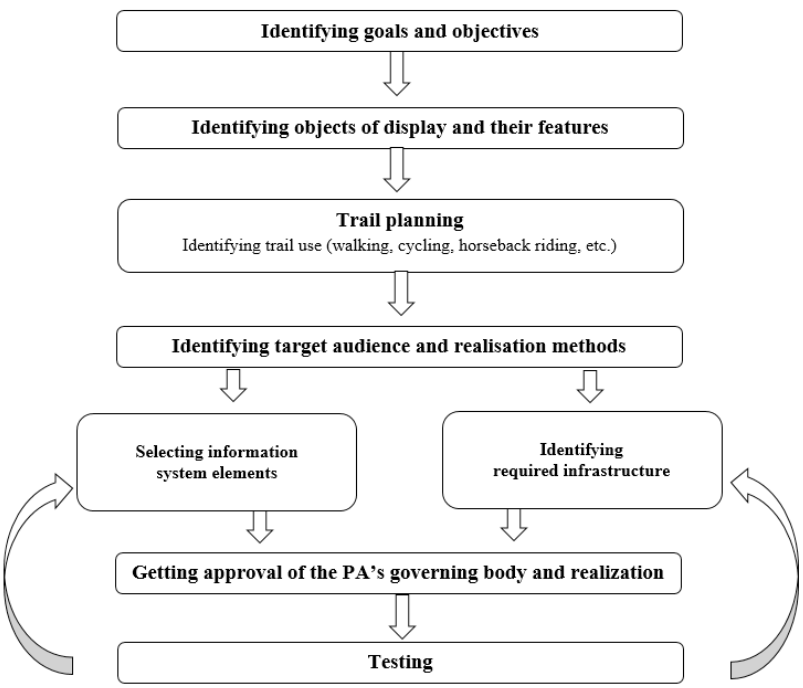

Fig. 1. Algorithm for creating a geotour trail in protected areas

Source: compiled by the authors.

[6] An entrance fee of visit to the Curonian Spit National Park will increase to 300 rubles, 2020, *Interfax*, available at: https://tourism.interfax.ru/ru/news/articles/75028/ (accessed 04.10.2021).

First, the goals and objectives of a specific ecotrail are determined. The reference points are the features of the ecosystem and attractions, as well as social demand. The goals and objectives of the trail were determined taking into account the main natural value of the Curonian Spit, a unique geomorphological formation created by the retreating glacier, winds, and currents. Bringing these features of the Spit to the focus will make it possible, firstly, to portray the Spit as a unique and vulnerable landscape in need of protection and careful handling and, secondly, it will allow the visitors to fully explore the scientific data on the geomorphology of the Spit, and in some cases to conduct simple research.

Types of tourism in the territory under consideration. Table 1 presents the common (or promising) types of tourism identified within the settlements and their adjacent territories, based on the available resources.

Table 1

Types of tourism within the tourist zones of the Curonian Spit

Areals	Nature tourism	Ecological tourism	Cultural tourism	Coastal tourism	Water tourism	Recreational fishing	Historical heritage	Geotourism
LITHUANIA								
Alksnynė	–	+	–	–	–	–	+	–
Juodkrantė	+	+	+	+	+	+	+	+
Pervalka	–	–	–	+	+	+	–	+
Preila	–	–	–	+	+	+	–	+
Nida	+	+	+	+	+	+	+	+
RUSSIA								
Morskoe	+	–	–	+	+	+	–	+
Rybachy	+	+	+	+	+	+	+	+
Lesnoe	–	–	–	+	+	+	+	–
Visitor center, 14th km of the Spit	+	+	+	+	+	–	+	–

Source: Compiled by the authors, 2020

As Table 1 shows, geotourism is one of the most promising types within the PAs. Its development is possible in six out of eight settlements.

To design the transboundary route "Geological and Geomorphological Chronicle of the Baltic", the most interesting geological and geomorphological objects were selected.

Geotourism objects in the Lithuanian part of the Curonian Spit. The Lithuanian part of the Curonian Spit National Park (lith. Kuršių nerijos nacionalinis parkas) is a good example for research and observation of geotourism formations and ongoing processes. The most important sites are the Parnidis Dune in Nida (located near the border with the Kaliningrad region of the Russian Federation), the "Dead Dunes" territorial complex in the Nagliai Nature Reserve near Juodkrante, the "Hill of Witches" in Juodkrante, and sandy hills in Smiltyne (in the northern part of the Curonian Spit)[7].

Dune migration is a long-term geomorphological process manifesting mainly along the Curonian Lagoon coast. The singularly shaped dune peaks, naturally formed slopes and sandy valleys, as well as endemic and ephemeral flora, attract the attention of ecotourists and other visitors seeking to explore the landscape and the most unique geomorphological formations in Northern Europe[8] [24]. Since 2017, following the updated methodology for the UN regional classification, Lithuania has been attributed to the group of Northern European countries. It is worth mentioning that owing to the natural geomorphological processes caused by the sand movement, many settlements were repeatedly relocated. Nida's current location is its fourth.

Another landscape of interest for geotourism is the bottom profile and the waters of the Curonian Lagoon. Its Lithuanian part is dominated by shoals and water landscapes of varying depths. This is not favourable for navigation, because the formation of shoals never stops owing to the geomorphological process of wind transport of sands to the Curonian Lagoon [25]. There are sapropel accumulations along the shores of the lagoon close to the "Dead Dunes" Nagliai Nature Reserve.

The Lithuanian part of the Curonian Spit is widest at the horn of Bulvikis where it reaches 3.8km in width; the narrowest point is in the village of Lesnoe, where the Spit is only 380m wide.

Geotourism objects in the Russian part of the Curonian Spit. Within the framework of the "Cross-heritage" international project, a geomorphological ecotrail was designed in the vicinity of Rybachy according to the suggested algorithm (Fig. 1). The approbation of the ecotrail resulted in selecting several objects.

An important object on the Russian part of the developed ecotrail is Lake Chaika — the largest lake in the Curonian Spit with an area of 0.22km^2. Once the lake housed a large colony of gulls of over 800 pairs. The lake stretches for 1,420 m from west to east. The average depth is 0.4 m, the maximum depth is 1.5 m. The flora of Lake Chaika is represented by 105 species of vascular plants. The species composition of the ichthyofauna is relatively poor. Crucian carp, tench, pike, loach, and stickleback prevail.

[7] Sudarytoja, M. (ed.) 2013, Natural geography of Lithuania [Lietuvos gamtinė geografija], *Eidukevičienė*, KU, p. 331 (In Lithuanian).

[8] Lietuvos saugomos teritorijos, [Protected areas of Lithuania], 2006, *Informacinis leidinys-žinynas*, Lututė, p.325 (In Lithuanian).

The next object of the ecotrail is the palve (from Prussian), wasteland. Palve is an eolian-marine accumulative plain. It was probably formed from a regressive marine terrace with a series of coastal ramparts subsequently built on by foredunes [26].

An important element of any natural ecosystem is the soil. The main parent materials on the Spit are eolian quartz sands of various granulometric composition. The thickness of sandy deposits varies significantly — from half a meter to dozens of meters. Another parent material is boulder calcareous loam forming brown earth[9]. A remarkable feature of the Spit is the presence of both well- and weakly developed soils. Well-developed soils are found at the beginning of the ecotrail. These are cultivated brown earth podzolic soils near Rybachy. They account for no more than 5% of the Spit. These soils formed on moraine calcareous loam historically covered by oak forests. Cultivated since the 13th century as arable lands, hayfields and pastures, they have developed a generous arable layer owing to human activities. A significant area of the Spit of about 15% consists of incompletely developed soils represented by semi-fixed sands. These soils are located on foredunes and dune ridges. Their vegetation cover is grasses of psammophytes, xerophytes, and willows, with moss and lichen spots. These are thin soils (ca 20 cm). Almost 20% of the area of the Curonian Spit National Park is not covered with soil.

The most unique and significant feature of the Curonian Spit landscape is a man-made foredune built in the 19th century.

A foredune is a natural and anthropogenic zone of modern eolian accumulation. On the Curonian Spit, there are two forms of foredunes. The first is a narrow strip of sandy hills with uniformly steep slopes facing land and sea. The second is flat sandy terraces leaning against the seaward slope of an older dune ridge. The foredune is 10—20 m wide, its height is 4—6 m. The foredune stands out not only geomorphologically, but also owing to the species composition of its vegetation. It is mostly covered by grasses and psammophytes, while woody and shrub plants are characteristic of the more ancient eolian formations. Owing to the current scarcity of sediments in some areas, the foredunes degrade, which manifests in deflation corridors. At the same time, large 50—100 m long tongues of the beach sands are drawn inland. They are called “deflation basins”, or “blowouts” [27]. Burnashov and Karmanov, having examined 333 basins, classified them into six groups. Sometimes the basins bend due to the dense shrub or herbaceous vegetation on the foredune, as the covered areas are less susceptible to blowing out than uncovered ones. As the basin develops, the wind following the path of least resistance bends around obstacles, forming curved shapes (hooks, crescents, etc.) [27]. A rare kind of elongated shallow deflation basin was discovered on the foredune and proposed for inclusion into the trail (Fig. 2).

[9] Materials of a comprehensive environmental study of marine and coastal areas of the Curonian Spit National Park for granting these areas the legal status of a marine protected zone. Implementation of the Baltic Sea Action Plan in Russia (BASE) project, 2020, *HELCOM,* available at: https://helcom.fi/media/publications/Extension-of-the-marine-protected-zone-of-the-Curonian-Spit-Final-Report-in-Russian.pdf (accessed 10.04.2021).

Fig. 2. Shallow deflation basin (photo by A. Yu. Anokhin).

Trail planning. At the next stage, the trail is planned taking into account the location of the target objects, as well as environmental requirements. If it is possible to use different modes of transportation, the trails for each of them are specified.

The first phase of the project involved the planning of the Russian part of the trail. Figure 3 shows the proposal.

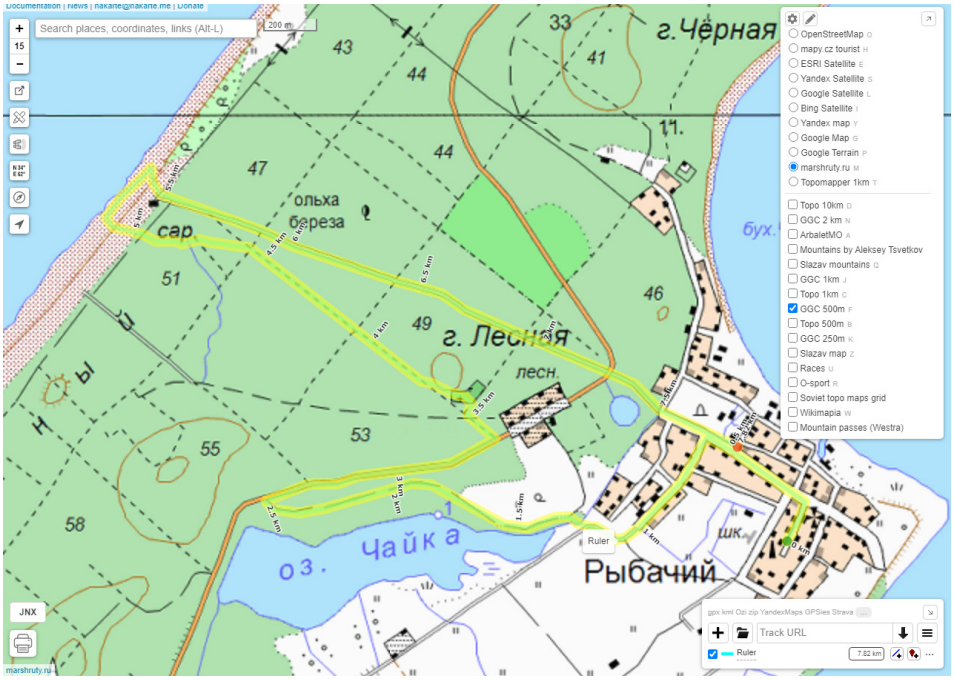

Fig. 3. Ecotrail route

Source: compiled by the authors.

The trail starts in Rybachy from the museum being created within the framework of the project. The trail follows the existing dirt road along the northern tip of Lake Chaika, then it goes along the highway, along forest roads through the palve to the foredune. Further, along the sea beach, the trail runs to a dirt road and back to the Rybachy village.

The scientific novelty of the trail and its qualitative difference from the existing routes in the Spit suggest a more accurate selection of the target group. There is a concept of "the sensitive period of development" in psychology and pedagogy: as a rule, for basic mental functions (perception, thinking, reflection, speech), it is between the 1st and 5th years of life. At the same age, simple behavioural manifestations are formed through the mechanism of interiorization of external social attitudes and rules. Complex behavioural manifestations including attitude towards nature are formed in early and middle school age. Therefore, the main target audience for forms of environmental education and upbringing in the PAs are primary and secondary school children, as well as older tourists, whose structure of value orientations has already formed and whose cognition is ready for the interaction with the ecosystem. En-route information is to be presented in the form of QR codes located at the existing stands, as well as in the form of an off-line audio guide downloaded from the National Park's website and other resources.

Since some parts of the trail go along the vulnerable elements of the landscape (the foredune), the infrastructure of the trail (its wooden flooring) is being simultaneously developed. The next step should be the approval of the trail infrastructure by the relevant authorities of the PAs (Scientific and Technical Council of the Curonian Spit National Park), its implementation and subsequent testing on the target groups. The trail quality control tools can be a questionnaire, testing or focus group interview methods. After approbation, if necessary, the trail is modified.

The next stage of work on the project involves the study of the Lithuanian part of the trail and combining both parts into a single tourist trail.

Discussion

The main objective of the study was to assess the ratio of environmental and recreational components of geotourism as a promising area of tourist activity in the protected areas. Attaining this objective with the parameters of a specific protected area in view is an important scientific and practical result of the study presented in the form of a correlation of positive and negative effects of the development of geotourism in PAs (tab. 2).

Table 2

Effects of geotourism development in the protected area

Positive effects	Negative effects
Preservation of the territory's natural, historical and cultural heritage; formation of infrastructure for its exploration	Impact of the infrastructure of tourist trails and their service (transport) on the natural environment
Preservation and development of the cultural and tourist potential of the territory	Tourist-generated environmental pollution
Environmental education; disseminating the knowledge about PA through tourism	Exceeding the permissible recreational load on the ecosystem potentially resulting in its degradation or disappearance
Improving economic indicators of the territory (jobs, financial flows, local taxes)	Negative changes in the ecosystem of the PA owing to the introduction of invasive species of plants, fungi, and bacteria associated with tourism development
Increased level of environmental education among the local population through raising their awareness of environmental potential being a value	Increased risks of fires, vandalism, destruction of unique elements of the ecosystem and other negative anthropogenic impacts
Increased cultural and educational level of the local population owing to its integration into tourist and excursion services	Changing the way of life of local communities, if it is authentic or of cultural value

Source: Compiled by the authors

The issue of infrastructure development in protected areas remains controversial to this day. As Table 2 shows, service and infrastructure development creates some negative impacts on the ecosystem. On the other hand, the development of infrastructure and services encourages a high level of visitors' interaction with the protected area's ecosystem, i. e. recreation with limited anthropogenic impact and progressive forms of environmental education. The lack of infrastructure and services determines a barbaric and consumerist attitude towards natural and other resources. Therefore, the development of the infrastructure for educational and ecological tourism in the PAs is the most promising avenue of their use on condition of meeting the objective criteria for conservation and the use of a specific ecosystem. In our opinion, it is not a system of prohibitions and restrictions, but rather the transmission of environmental values through methodological and infrastructure-mediated forms of environmental education that will make it possible to fully preserve and develop the ecosystem of the protected area. The introduction of new tourist trails, including those based on geoheritage, is a significant component of the conservation and sustainable development of territories with a special nature conservation status.

Conclusions

Following M. V. Zotova and A. B. Sebentsov who raised this issue in 2017 in the collection of papers "In the focus of heritage" developing the ideas of Yu.A. Vedenin, we should take note of the conflict between nature conservation and recreational activities arising in the operation of protected areas: "tourism and heritage conservation are often considered complementary activities since it is the heritage that is one of the main resources for tourism development" [28, P.479]. Meanwhile, modern PAs are not just territories with protected biogeocenoses. They should function as an integrated technological system, where the protection and study of natural heritage, on the one hand, and environmental education and recreation, on the other, intertwine, synergistically reinforcing each other. If there is no interaction between them, the processes become mutually exclusive.

We presume that the described conflict can be resolved through designing innovative, technological, and environmentally friendly means and forms of recreation. The exploration of the best practices for the development of geotourism in protected areas made it possible to identify major methods of disseminating environmental knowledge. The example of the Curonian Spit National Park was used to study and analyze the natural potential of the territory as a base for the development of geotourism. The "growth points" created on this platform ensured spatial decentralization and thematic differentiation of forms and methods of recreation. The principles and algorithm for designing qualitatively new techniques for recreation and environmental education were developed. We conducted a detailed study and analysis of the natural potential to create an algorithm for designing an ecotrail. It includes axiological, cognitive and educational aspects of environmental education integrated into an attractive recreational form. The resource potential and activities of other studied PAs allow us to consider the possibility of extrapolating the proposed technique to most national parks. This is what makes it possible to resolve the revealed contradiction at a qualitatively new level through innovative modernization of the recreational and educational activities of national parks.

References

1. Hose, T. A. 2011, The English Origins of Geotourism (as a Vehicle for Geoconservation) and Their Relevance to Current Studies, *Acta geographica Slovenica,* vol. 51, no. 2, p. 343—359.

2. Hose, T. A. 2012, Editorial: Geotourism and Geoconservation, *Geoheritage,* vol. 4, no. 1, p. 1—5.

3. Hose, T. A., Marković, S. B., Komac, B., Zorn, M. 2011, Geotourism — a short introduction, *Acta geographica Slovenica*, vol. 51, no. 2, p. 339—342.

4. Gray, M. 2004, *Geodiversity. Valuing and Conserving Abiotic Nature*, John Wiley & Sons, Chichester, UK, available at: https://geoduma.files.wordpress.com/2010/02/geodiversity.pdf (accessed 10 March 2021).

5. Gordon, J. E. 2018, Geoheritage, Geotourism and the Cultural Landscape: Enhancing the Visitor Experience and Promoting Geoconservation, *Geosciences*, vol. 8, no. 4, p. 136. doi: https://doi. org/10.3390/geosciences8040136.

6. Dowling, R. K. 2013, Global Geotourism — An Emerging Form of Sustainable Tourism, *Czech journal of tourism*, vol. 2, no. 2. doi: https://doi.org/10.2478/cjot-2013-0004.

7. Santangelo, N., Valente, E., 2020, Geoheritage and Geotourism Resources, *Resources*, vol. 9, no. 7, art. 80. doi: https://doi.org/10.3390/resources9070080.

8. Justice, S. C. 2018, UNESCO Global Geoparks, Geotourism and Communication of the Earth Sciences: A Case Study in the Chablais UNESCO Global Geopark, France, *Geosciences,* vol. 8, no. 5, art. 149. doi: https://doi.org/10.3390/geosciences8050149.

9. Becerra-Ramírez, R., Gosálvez, R. U., Escobar, E., González, E., Serrano-Patón, M., Guevara, D. 2020, Characterization and Geotourist Resources of the Campo de Calatrava Volcanic Region (Ciudad Real, Castilla-La Mancha, Spain) to Develop a UNESCO Global Geopark Project, *Geosciences*, vol. 10, no. 11, art. 441. doi: doi. org/10.3390/geosciences10110441.

10. Zgłobicki, W., Kukiełka, S., Baran-Zgłobicka, B. 2020, Regional Geotourist Resources—Assessment and Management (A Case Study in SE Poland), *Resources,* vol. 9, no. 2, art. 18. doi: doi.org/10.3390/resources9020018.

11. Badiali, F., Ilieş, D., Castaldini, D. 2018, A tale of a city, through its urban landscaṭ pe and cultural heritage in the heart of Europe: the case study of Oradea city (Romania), *GeoJournal of Tourism and Geosites,* Year XI, no. 1, vol. 21, p.88—102.

12. Chashina, B., Ramazanova, N., Atasoy, E., Berdenov, Zh., Ilieş, D. C. 2020, Natural recreation potential of the West Kazakhstan region of the Republic of Kazakhstan, *GeoJournal of Tourism and Geosites*, vol. 32, no. 4, p. 1355—1361. doi: https://doi.org/10.30892/gtg.32424-580.

13. Ardislamov, F. R. 2019, Geopark "Toratau": geological heritage as an object of ecological tourism. In: Ardislamov, F. R., Lukashina, N. A., Tretyakova, E. A. (eds.) *Trudy Kolskogo Nauchnogo Zentra RAN* [Proceedings of the Kola Scientific Center of the Russian Academy of Sciences], vol. 10. no. 6—1, p. 25—32. doi: 10.25702/KSC.2307-5252.2019.6.003 (In Russ.).

14. Soboleva, N. P. 2006, Comprehensive assessment of natural and socio-economic conditions of the Altai Republic for the purposes of geotourism, *Geographia i prirodnye resursy* [Geography and nature, resources], no. 2, p. 131—136 (In Russ.)

15. Redkin, A. G., Otto, O. V. 2015, Geopark as a new direction of tourism development in the mountainous regions of the Altai Territory, *Nauka i turism: strategii vzaimodeistvija* [Science and tourism: interaction strategies], no. 4 (2), available at: https://cyberleninka. ru/article/n/geopark-kak-novoe-napravlenie-razvitiya-turizma-v-gornyh-rayonah-altayskogo-kraya (accessed 10 April 2021) (In Russ.).

16. Ruban, D. A. 2017, Unique centers of geodiversity in Russia: some organizational and legal issues. In: Ruban, D. A. (ed.) *Sovremennye problemy prava, economiki i upravlenijz,* no. 1 (4), p. 126—130 (In Russ.)

17. Ruban, D. A. 2021, Real and Promoted Aesthetic Properties of Geosites: New Empirical Evidence from SW Russia. In: Ruban, D. A., Yashalova, N. N. (eds.) *Heritage,* vol. 4, no 1. p. 160—170. doi 10.3390/heritage4010009.

18. Ruban, D. A. 2012, Geoconservation organizations and management support for their effective activities in the context of the paradigm of the use of specially protected natural areas, *Vestnik Taganrogskogo institute upravlenija i economiki* [Bulletin of the Taganrog Institute on management and economics], no. 1, p. 19—24 (In Russ.)

19. Shaplygina, T. V., Volkova, I. I. 2013, Natural and anthropogenic transformation of landscapes and relief of the Curonian and Vistula spits, *Geomorphologia* [Geomorphology], no. 1, p. 95—103 (In Russ.).

20. Shaplygina, T. V., Volkova I. I. 2017, Geoecological aspects of recreational nature management in the Curonian Spit National Park. In: *Problemy prirodopolsovanija, sokhranenija bioraznoobrazija I kulturnogo nasledija na osobo okhranjaemykh prirodnykh territorijakh Rossii*, Materials of the Russian Sientific and Practical Jubelee conference, devoted to the 30th yeas Jubelee of the National park "Kurshskaja kosa/Curonian spit", p. 128—134 (In Russ).

21. Kropinova, E. G. 2017, The Reduction in the Beach Area as the Main Limiting Factor for Sustainable Tourism Development (Case for the Kaliningrad Oblast). In: Gritsenko, V. A., Sivkov, V. V., Yurov, A. V., Kostianoy, A. G. (eds.) *Terrestrial and Inland Water Environment of the Kaliningrad Region. The Handbook of Environmental Chemistry,* vol 65, Springer, Cham. doi: doi.org/10.1007/698_2017_113.

22. Spiriajevas, E., Perminas, K., Locaitienė, V. 2020, *Laivybos kliūčių šalinimo Kuršių mariose galimybių studija* [Feasibility study for the removal of shipping barriers in the Curonian Lagoon], p. 190, available at: https://www.klaipedos-r.lt/index.php?2285236220) (accessed 10 April 2021) (In Lithuanian).

23. Gutak, J. M. 2014, Regional Geological Heritage. In: Tiess, G., Majumder, T., Cameron, P. (eds.) *Encyclopedia of Mineral and Energy Policy,* Springer, Berlin, Heidelberg. doi: doi. org/10.1007/978-3-642-40871-7_10-1.

24. Vaitkevičius, V., Baltrūnas, V. 2009, *Lietuva: 101 įdomiausia vieta*, [Lithuania: 101 most interesting places], Alma littera, p.313.

25. Kilkus, K., Stonevičius, E. 2011, Lietuvos vandenų geografija [Geography of Lithuanian waters], VU, p. 184.

26. Zhukovskaya, I. P., Kharin, G. S. Curonian spit — geological phenomena, *Samarskaja Luka: problem regionalnoj i globalnoj ecologii,* vol. 18, no. 4, p. 60—69, available at: https://www. elibrary. ru/download/elibrary_18075030_69281899.pdf_(accessed 10 April 2021) (In Russ.).

27. Burnashov, E. M., Karmanov, K. B. 2016, Deflation processes at the marine coast of the Curonian spit, *Uchenye zapiski Rossijskogo gosudarstvennogo gidrometeo university* [Scientific Notes of the Russian State Hydrometeorological University], no. 45, p. 180—191, available at: http://www.rshu. ru/university/notes/archive/issue45/uz45-180-191.pdf (accessed 10 April 2021) (In Russ.).

28. Zotova, M. V., Sebentsov, A. B. 2017, Tourism and cultural heritage of the Kaliningrad region: ways and prospects of development. In: *V focuse naslediyz* [Focus on heritage], Collection of articles dedicated to the 80th anniversary of Yu. A. Vedenin and the 25th anniversary of the creation of the Russian Research Institute for Cultural and Natural Heritage named after D. S. Likhachev, Moscow, Federal State Budgetary Institution of Science Institute of Geography of the Russian Academy of Sciences, p. 478—488.

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